WHAT IS CLAIMED IS:

1. A communication device using a communication method of simultaneously transmitting and receiving a plurality of N carriers to receive known signals by K ($\leqq$ N) carriers among the N carriers, the device comprising:

a delay information calculating unit for determining from within receiving signals an amount of shift of amplitude and phase of each of the K carriers indicative of the known signal to determine delay information of receiving radio waves in response to thus determined amount of shift.

2. The communication device according to claim 1, wherein:

the delay information calculating unit estimates, when there is a carrier hole, the amount of shift of the amplitude and phase in a part corresponding to the carrier hole based on the amount of shift of carriers next to the carrier hole among the N carriers, and determines the delay information based on the amount of shift in each of the K carriers along with the estimated amount of shift.

3. The communication device according to claim 1, wherein:

the delay information calculating unit calculates, when there is a carrier hole, the amount of shift of the carrier in a lower frequency side next to the carrier hole among the N carriers, and calculates the amount of shift of the carrier in

the higher frequency side next to the carrier hole among the N carriers to determine the delay information based on the amount of shift of the carrier in the higher frequency side together with the amount of shift of the carrier in the lower frequency side.

4. The communication device according to claim 1, wherein:

the delay information calculating unit uses MUSIC method.

5. The communication device according to claim 1, wherein:

the delay information calculating unit uses ESPRIT method.

6. The communication device according to claim 1, further comprising:

a detector for detecting a leading head of the receiving radio waves; and

a timing determining unit for determining timing that the detector first detects the leading head of the receiving radio waves as synchronization timing of the receiving radio waves.

7. The communication device according to claim 6, wherein:

the detector outputs a correlative value of the leading head of the receiving radio waves; and

the timing determining unit compares the correlative value with a threshold value to determine the synchronization timing based on this comparison.

8. The communication device according to claim 1, further comprising:

a detector for detecting a leading head of the receiving radio waves;

a timing determining unit for determining synchronization timing of the receiving radio waves based on detection by the detector;

a discriminator unit for determining whether the receiving radio waves have been received prior to the synchronization timing in response to the delay information;

a timing reconfiguring unit for reconfiguring the synchronization timing by means of the receiving radio waves received prior to the synchronization timing, when the discriminator unit determines that the receiving radio waves have been received prior to the synchronization timing; and

a delay information recalculating unit for determining the delay information again in response to the reconfigured synchronization timing and the received signals.

9. The communication device according to claim 1, further comprising:

a compensator unit for compensating for the shift of information signals in the receiving radio waves in response to the delay information from the delay information calculating unit.

10. The communication device according to claim 1, further comprising:

a transmitter unit for transmitting transmission signals having a guard interval added at a leading head thereof; and

a time setting unit for setting time of the guard interval to a maximum configurable time.

11. A communication device using a communication method of simultaneously transmitting and receiving a plurality of N carriers to receive known signals by K ($\leqq$ N) carriers among the N carriers, the device comprising:

a transmitter unit for transmitting transmission signals having a guard interval added thereto;

a delay information calculating unit for determining from within the received signals an amount of shift of amplitude and phase of each of the K carriers indicative of the known signals to determine the delay information of receiving radio waves in response to each amount of shift thus determined; and

a time setting unit for setting time of the guard interval in response to the delay information.

12. The communication device according to claim 11, wherein:

the transmitter unit transmits information signals together with the guard interval as the transmission signals, the guard interval being added to a leading side of the information signal; and

the time setting unit sets, when the delay information calculating unit determines delay in a plurality of receiving radio waves as the delay information, the time of the guard interval to a value longer than a maximum delay of delays in the plurality of receiving radio waves.

13. The communication device according to claim 10, further comprising:

a time information adding unit for adding time information indicative of the time of the guard interval to the transmission signal.

14. A communication device using a communication method of simultaneously transmitting and receiving a plurality of N carriers to receive known signals by K ($\leqq$ N) carriers among the N carriers, comprising:

M sets of antennas and receivers;

a delay information calculating unit for determining, for each set of the antenna and receiver, an amount of shift of amplitude and shift of each of the K carriers indicative of the known signal in receiving signals to determine an arrival

direction and delay information of receiving radio waves in response to the amount of shift thus determined.

15. A communication device using a communication method of simultaneously transmitting and receiving a plurality of N carriers to receive known signals by K ($\leqq$ N) carriers among the N carriers, comprising:

M sets of antennas and receivers;

a separator unit for separating signals received by the M sets of antennas and receivers into signals for each arrival direction;

a delay information calculating unit for determining, for each of the signals separated, an amount of shift of amplitude and phase of each of the K carriers indicative of the known signal from within the signals to determine an arrival direction and delay information of receiving radio waves in response to each amount of shift thus determined.

16. A communication device using a communication method of simultaneously transmitting and receiving a plurality of N carriers to receive known signals by K ($\leqq$ N) carriers of the N carriers, comprising:

M sets of antennas and receivers, each of the M antennas having a different directivity from others;

a delay information calculating unit for determining, for each set of the antenna and the receiver, an amount of shift of the amplitude and phase of each of the K carriers indicative

of the known signal from within the signal received to determine an arrival direction and delay information of receiving radio waves in response to the amount of shift thus determined.

17. The communication device according to any one of claims 14 to 16, wherein:

the delay information calculation unit determines, upon determination of the delay information of a plurality of receiving radio waves, the arrival direction of the receiving radio wave having a maximum receiving power among the plurality of receiving radio waves based on the delay information to selectively demodulate the receiving radio wave of that arrival direction.

18. The communication device according to any one of claims 14 to 16, further comprising:

a demodulator unit eliminates, upon determination of the delay information of a plurality of receiving radio waves, receiving radio waves among the plurality of receiving radio waves having delay longer than the time of guard interval prior to demodulation based on the delay information thus determined.

19. The communication device according to any one of claims 1, 11, 14, 15 and 16, wherein:

the communication method is an orthogonal multiplexing carrier method.